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Connectivity Categories and Selection Considerations

	NIC	HBA	CNA
Primary Purpose	Basic Ethernet Connectivity	Connection to SAN/DAS	Converged Network and SAN connectivity
Cost	Lower cost than CAN, aligns with throughput.	Aligns with function (Fibre Channel vs SAS), Features and throughput	Higher Cost than NIC, aligns with throughput
Storage Function	Can support FCoE or iSCSI with OS Software drivers	Support Fibre Channel or SAS connections (specific per adapter), no FCoE or iSCSI	Provides hardware offload for FCoE and iSCSI
Ethernet Support	Yes	No	Yes
Virtualization Support	Follows Server Compatibility Matrix	Follows Server Compatibility Matrix	Follows Server Compatibility Matrix
Select for	• Cost Sensitive installations • Limited or no iSCSI, FCoE • No Converged networking plans	• SAN/DAS connectivity	• Existing or planned converged networks • FCoE, iSCSI requirements • Future proof against FCoE, iSCSI, Converged requirements • Large virtualized deployment

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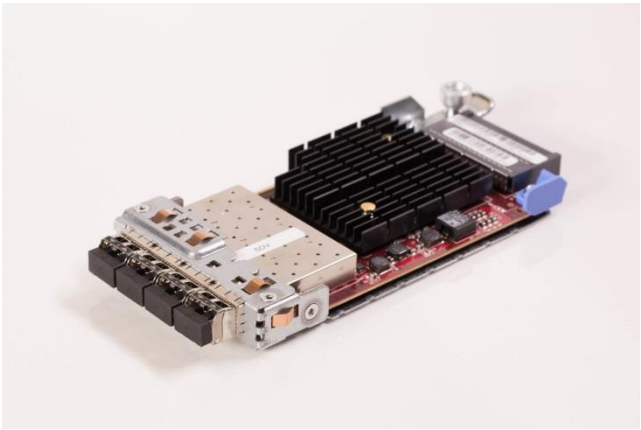
AnyFabric

- Advanced connectivity options in Mezzanine card form factor
  - CNA up to 4x10Gbps
  - NIC up to 2x10Gbps
  - HBA Up to 16Gbps Fibre Channel
- Allows expansion without consuming PCIe slots



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NIC Features (Summary Table)

	Lenovo ThinkServer I350-T2 PCIe 1Gb 2 Port Base-T Ethernet Adapter by Intel	Lenovo ThinkServer I350-T4 PCIe 1Gb 4 Port Base-T Ethernet Adapter by Intel	Lenovo ThinkServer X520-SR2 PCIe 10Gb 2 Port SFP+ Ethernet Adapter by Intel	Lenovo ThinkServer X520-DA2 PCIe 10Gb 2 Port SFP+ Ethernet Adapter by Intel	Lenovo ThinkServer X540-T2 PCIe 10Gb 2 Port Base-T Ethernet Adapter by Intel
Manufacturer	Intel	Intel	Intel	Intel	Intel
Ports	2	4	2	2	2
Throughput	1 Gbps	1 Gbps	10 Gbps	10 Gbps	10 Gbps
Host Bus Interface	PCIe v2.1	PCIe v2.1	PCIe v2.0	PCIe v2.0	PCIe v2.1
Supported Features	iSCSI Support, QOS, FPP, VMDQ, SR-IOV, PXE boot, iSCSI boot	iSCSI Support, QOS, FPP, VMDQ, SR-IOV, PXE boot, iSCSI boot	DCB Support, iSCSI support, FCoE support, IPSec Offload, QOS, MSI-X, SR-IOV, PXE boot, iSCSI boot, FCoE Boot	DCB Support, iSCSI support, FCoE support, IPSec Offload, QOS, MSI-X, SR-IOV, PXE boot, iSCSI boot, FCoE Boot	DCB Support, iSCSI support, FCoE support, IPSec Offload, QOS, MSI-X, SR-IOV, PXE boot, iSCSI boot, FCoE Boot
OS	Windows, Linux, VMware	Windows, Linux, VMware	Windows, Linux, VMware	Windows, Linux, VMware	Windows, Linux, VMware
Form Factor	Low Profile	Low Profile	Low Profile	Low Profile	Low Profile
Management	Intel Advanced Network Services (Intel ANS), Intel PROSet for Windows	Intel Advanced Network Services (Intel ANS), Intel PROSet for Windows	Intel PROSet for Windows, SNMP	Intel PROSet for Windows, SNMP	Intel PROSet for Windows, SNMP
Cable Medium	RJ-45 Copper	RJ-45 Copper	SFP+ Fiber	SFP+ Direct Attach Copper	RJ-45 Copper
Protocols	Ethernet, iSCSI	Ethernet, iSCSI	Ethernet, iSCSI, FCoE	Ethernet, iSCSI, FCoE	Ethernet, iSCSI, FCoE
Support Matrix					
TD350	●	●	●	●	●
RD550	●	●	●	●	●
RD650	●	●	●	●	●

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AnyFabric NIC Features (Summary Table)

	Lenovo ThinkServer I350-T4 AnyFabric 1Gb 4 Port Base-T Ethernet Adapter by Intel	Lenovo ThinkServer X520-DA2 AnyFabric 10Gb 2 Port SFP+ Ethernet Adapter by Intel	Lenovo ThinkServer X540-T2 AnyFabric 10Gb 2 Port Base-T Ethernet Adapter by Intel
Manufacturer	Intel	Intel	Intel
Ports	4	2	2
Throughput	1 Gbps	10 Gbps	10 Gbps
Host Bus Interface	PCIe v2.1	PCIe v2.0	PCIe v2.1
Supported Features	iSCSI Support, QOS, FPP, VMDQ, SR-IOV, PXE boot, iSCSI boot	DCB Support, iSCSI support, FCoE support, IPSec Offload, QOS, MSI-X, SR-IOV, PXE boot, iSCSI boot, FCoE Boot	DCB Support, iSCSI support, FCoE support, IPSec Offload, QOS, MSI-X, SR-IOV, PXE boot, iSCSI boot, FCoE Boot
OS	Windows, Linux, VMware	Windows, Linux, VMware	Windows, Linux, VMware
Form Factor	Mezzanine card	Mezzanine card	Mezzanine card
Management	Intel Advanced Network Services (Intel ANS), Intel PROSet for Windows	Intel PROSet for Windows, SNMP	Intel PROSet for Windows, SNMP
Connector / Cable	RJ-45 Copper	SFP+ Direct Attach Copper	RJ-45 Copper
Protocols	Ethernet, iSCSI	Ethernet, iSCSI, FCoE	Ethernet, iSCSI, FCoE
Support Matrix			
TD350	-	-	-
RD550	●	●	●
RD650	●	●	●

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HBA Features (Summary Table)

	Lenovo ThinkServer LPe16002B-M8-L PCIe 8Gb 2 port Fibre Channel Adapter by Emulex	Lenovo ThinkServer LPe16002B-M6-L PCIe 16Gb 2 port Fibre Channel Adapter by Emulex	Lenovo ThinkServer QLE2672 PCIe 16Gb 2 port Fibre Channel Adapter by Qlogic
Manufacturer	Emulex	Emulex	Qlogic
Ports	2	1 LPe16000, 2 LPE16002	2
Throughput	8 Gbps	16 Gbps	16 Gbps
Host Bus Interface	PCIe 3.0	PCIe 3.0	PCIe V3.0
Device Interface	Fibre Channel	Fibre Channel	Fibre Channel
Supported Features	MSI-X, NPIV FC-SP, T10 PI, GreenState, vEngine	MSI-X, NPIV FC-SP, T10 PI, GreenState, vEngine	1.2M IOPS, NPIV, MSI-X, FC-SP, StarPower
OS	Windows, Linux, VMware	Windows, Linux, VMware	Windows, Linux, VMware
Form Factor	Low Profile	Low Profile	Low Profile
Management	OneCommand Manager OneCommand Manager for vCenter, CLI	OneCommand Manager OneCommand Manager for vCenter, CLI	QConvergeConsole® (QCC). HBA API, SMI-S
Protocols	Fibre Channel	Fibre Channel	Fibre Channel
Support Matrix			
TD350	•	•	•
RD550	•	•	•
RD650	•	•	•

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AnyFabric HBA Features (Summary Table)

AnyFabric™

	Lenovo ThinkServer LPm15004B- M8-L AnyFabric 8Gb 4 port Fibre Channel Adapter By Emulex	Lenovo ThinkServer LPm16002B-M6-L AnyFabric 16Gb 2 port Fibre Channel Adapter By Emulex
Manufacturer	Emulex	Emulex
Ports	4	2
Throughput	8 Gbps	16 Gbps
Host Bus Interface	PCIe v3.0	PCIe 2.0
Device Interface	Short Wave Optical – LC SFP+	Short Wave Optical – LC SFP+
Supported Features	MSI-X, NPIV FC-SP, T10 PI, GreenState, vEngine	MSI-X, NPIV FC-SP, T10 PI, GreenState, vEngine
OS	Windows, Linux, VMware	Windows, Linux, VMware
Form Factor	Low Profile	Low Profile
Management	OneCommand Manager OneCommand Manager for vCenter, CLI	OneCommand Manager OneCommand Manager for vCenter, CLI
Protocols	Fibre Channel	Fibre Channel
Support Matrix		
TD350	-	-
RD550	•	•
RD650	•	•

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CNA Features (Summary Table)

	Lenovo ThinkServer OCe14102-UX-L PCIe 10Gb 2 Port SFP+ Converged Network Adapter by Emulex	Lenovo ThinkServer OCe14401-UX-L PCIe 40Gb 1 Port QSFP+ Converged Network Adapter by Emulex
Manufacturer	Qlogic	Emulex
Ports	2	1
Throughput	10Gbps	40Gbps
Host Bus Interface	PCIe v3.0	PCIe v3.0
Device Interface	SFP+	QSFP+
Supported Features	FCoE Offloads, iSCSI Offloads, NVGRE & VXLAN, SR-IOV, NPIV, Jumbo Frames, QOS, MSI-X, LSO, LRO, RSS, VMware® NetQueue and Microsoft® VMQ, PXE Boot, iSCSI Boot, FCoE Boot, T10 PI, DCB Support	FCoE Offloads, iSCSI Offloads, NVGRE & VXLAN, SR-IOV, NPIV, Jumbo Frames, QOS, MSI-X, LSO, LRO, RSS, VMware® NetQueue and Microsoft® VMQ, PXE Boot, iSCSI Boot, FCoE Boot, T10 PI, DCB Support
OS	Windows, Linux, VMware	Windows, Linux, VMware
Form Factor	Low Profile	Low Profile
Management	OneCommand Manager OneCommand Manager for vCenter, CLI	OneCommand Manager OneCommand Manager for vCenter, CLI
Protocols	Ethernet, iSCSI, FCoE	Ethernet, iSCSI, FCoE
Support Matrix		
TD350	•	•
RD550	•	•
RD650	•	•

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AnyFabric CNA Features (Summary Table)

AnyFabric™

	Lenovo ThinkServer OCm14102-UX-L AnyFabric 10Gb 2 Port SFP+ Converged Network Adapter by Emulex	Lenovo ThinkServer OCm14104-UX-L AnyFabric 10Gb 4 Port SFP+ Converged Network Adapter by Emulex
Manufacturer	Qlogic	LSI
Ports	2	4
Throughput	10Gbps	10Gbps
Host Bus Interface	PCIe v3.0	PCIe v3.0
Device Interface	SFP+	SFP+
Supported Features	FCoE Offloads, iSCSI Offloads, NVGRE & VXLAN, SR-IOV, NPIV, Jumbo Frames, QOS, MSI-X, LSO, LRO, RSS, VMware® NetQueue and Microsoft® VMQ, PXE Boot, iSCSI Boot, FCoE Boot, T10 PI, DCB Support	FCoE Offloads, iSCSI Offloads, NVGRE & VXLAN, SR-IOV, NPIV, Jumbo Frames, QOS, MSI-X, LSO, LRO, RSS, VMware® NetQueue and Microsoft® VMQ, PXE Boot, iSCSI Boot, FCoE Boot, T10 PI, DCB Support
OS	Windows, Linux, VMware	Windows, Linux, VMware
Form Factor	Low Profile	Low Profile
Management	OneCommand Manager, OneCommand Manager for VMware	OneCommand Manager, OneCommand Manager for VMware
Cable Medium	Fiber	Fiber
Protocols	Ethernet, iSCSI, FCoE	Ethernet, iSCSI, FCoE
Support Matrix		
TD350	-	-
RD540	●	●
RD640	●	●

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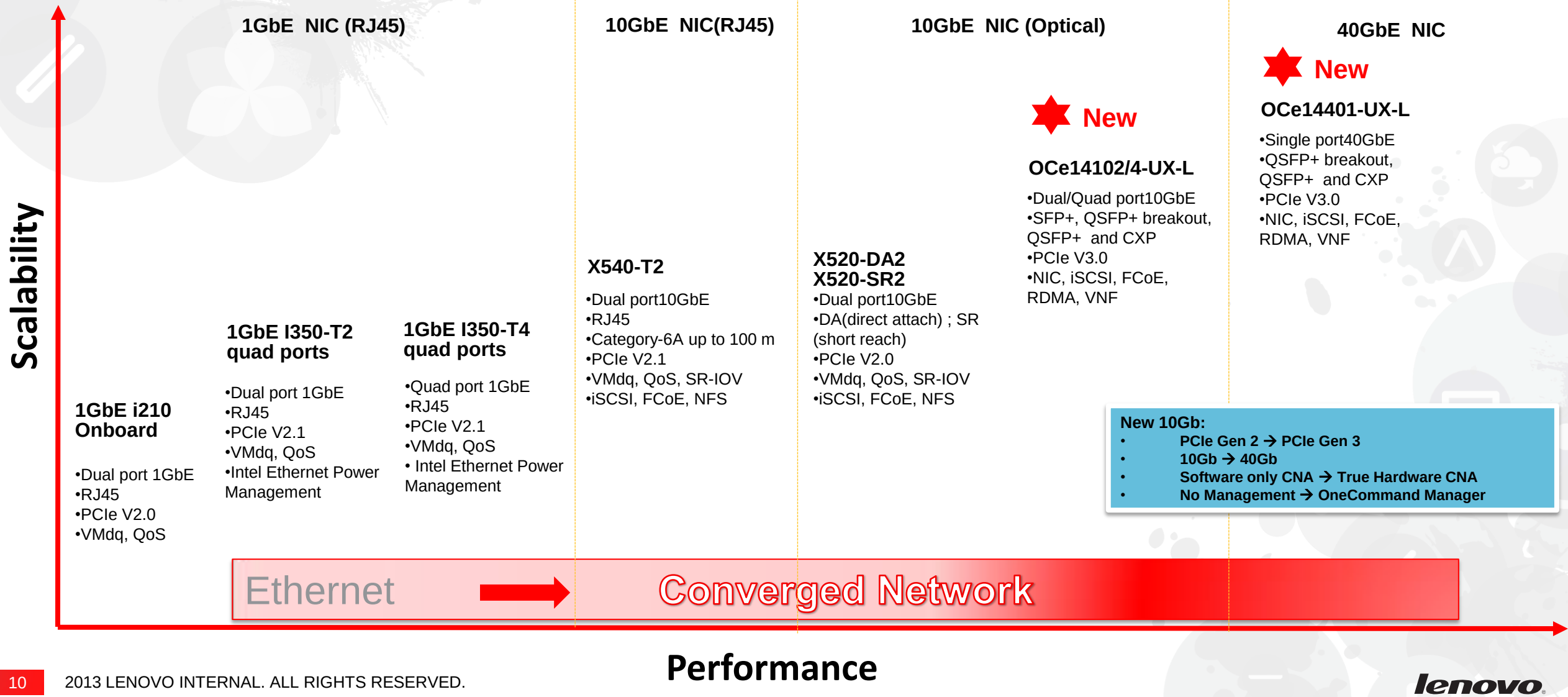
ThinkServer NIC/CNA Portfolio Positioning



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NIC

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Lenovo Direction - NICs

- Intel Network Interface Controllers (NICs) are industry leading for enterprise applications
- Lenovo offers Intel NICS to fulfill key customer requirements
  - Basic 1Gbps Ethernet, Dual Port RJ-45 – i350-T2 (PCIe)
  - Basic 1Gbps Ethernet, Quad Port RJ-45 – i350-T4 (PCIe and AnyFabric)
  - 10 Gbps Ethernet, Dual Port Short Range (SR) Fiber – X520-SR2 (PCIe)
  - 10 Gbps Ethernet, Dual Port direct attach copper – X520-DA2 (PCIe and AnyFabric)
  - 10 Gbps Ethernet, Dual Port RJ-45 – X540-T2 (PCIe and AnyFabric)
- Customers will usually make choices based on existing or planned infrastructure based on speed and cable media

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i350-T2 / i350-T4

Name	Lenovo ThinkServer I350-T2 PCIe 1Gb 2 Port Base-T Ethernet Adapter by Intel Lenovo ThinkServer I350-T4 PCIe 1Gb 2 Port Base-T Ethernet Adapter by Intel
Function	NIC
OS Support	Windows, Linux, VMware
Virtualization Support	Yes
Ports	2xRJ-45 (i350-T2) / 4xRJ-45 (i350-T4) 1Gbps
Speed	10/100/1000
Supported Protocols	Ethernet
Interface	PCIe v2.1
Features	• iSCSI Support • QOS • Flexible Port Provisioning (FPP) • Virtual Machine Device Queues (VMDQ) • SR-IOV Capable • Energy Efficient Ethernet • DMA Coalescing • PXE, iSCSI boot • Jumbo Frames • Direct Cache Access
Tools	Intel Advanced Network Services (Intel ANS), Intel PROSet for Windows

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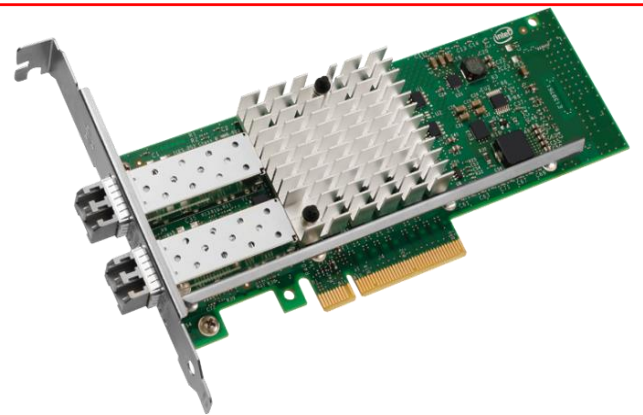
X520-SR2 / X520-DA2

Name	Lenovo ThinkServer X520-SR2 PCIe 10Gb 2 Port SFP+ Ethernet Adapter by Intel Lenovo ThinkServer X520-DA2 PCIe 10Gb 2 Port SFP+ Ethernet Adapter by Intel	
Function	NIC	
OS Support	Windows, Linux, VMware	
Virtualization Support	Yes	
Ports	• 2 SFP+ (X520-SR2 has optics installed, X520-DA2 is direct attach ready) 10Gbps	
Supported Protocols	• Ethernet, iSCSI, FCoE,	
Interface	• PCIe v2.0	
Features	• Intel® 82599 10 Gigabit Ethernet Controller • Intel Direct I/O Technology • DCB Support • iSCSI support • FCoE support • IPSec Offload • QOS • Virtual Machine Device Queues (VMDq), Next Gen VMDq	• Virtual Machine Load Balancing (VMLB) • Jumbo Frames • MSI-X • SR-IOV Capable – 64 Virtual Functions per port • Energy Efficient Ethernet • DMA Coalescing • Full wake up support • PXE, iSCSI, FCoE boot • Direct Cache Access (DCA)
Tools	• Intel PROSet for Windows, SNMP	



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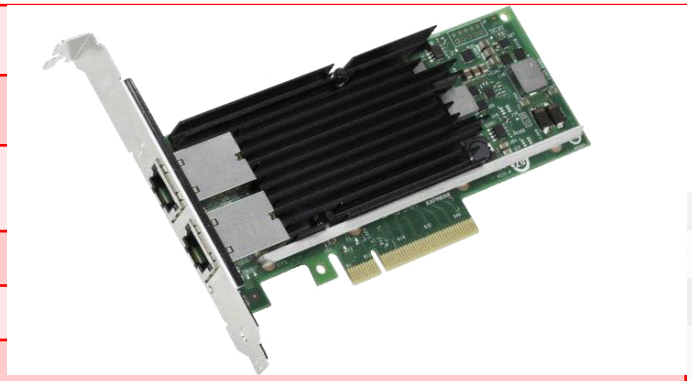
X540-T2

Name	Lenovo ThinkServer X540-T2 PCIe 10Gb 2 Port Base-T Ethernet Adapter by Intel	
Function	NIC	
OS Support	Windows, Linux, VMware	
Virtualization Support	Yes	
Ports	• 2xRJ-45 10Gbps	
Supported Protocols	• Ethernet, iSCSI, FCoE	
Interface	• PCIe v2.1	
Features	• Intel® X540 10 Gigabit Ethernet Controller • Intel Direct I/O Technology • iSCSI support • FCoE support • DCB Support • IPSec Offload • QOS • Virtual Machine Device Queues (VMDq), Next Gen VMDq • Virtual Machine Load Balancing (VMLB)	• Jumbo Fames • MSI-X • SR-IOV Capable – 64 Virtual Functions per port • Multi-Core load balancing • Flexible Port Provisioning (FPP) • Energy Efficient Ethernet • DMA Coalescing • Full wake up support • PXE, iSCSI, FCoE Boot
Tools	• Intel PROSet for Windows, SNMP	



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AnyFabric i350-T4

Name	Lenovo ThinkServer I350-T2 AnyFabric 1Gb 2 Port Base-T Ethernet Adapter by Intel Lenovo ThinkServer I350-T4 AnyFabric 1Gb 2 Port Base-T Ethernet Adapter by Intel
Function	NIC
OS Support	Windows, Linux, VMware
Virtualization Support	Yes
Ports	2xRJ-45 (i350-T2) / 4xRJ-45 (i350-T4) 1Gbps
Speed	10/100/1000
Supported Protocols	Ethernet
Interface	PCIe v2.1
Features	• iSCSI Support • QOS • Flexible Port Provisioning (FPP) • Virtual Machine Device Queues (VMDQ) • SR-IOV Capable • Energy Efficient Ethernet • DMA Coalescing • PXE, iSCSI boot • Jumbo Frames • Direct Cache Access
Tools	Intel Advanced Network Services (Intel ANS), Intel PROSet for Windows

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AnyFabric X520-DA2

Name	Lenovo ThinkServer X520-DA2 AnyFabric 10Gb 2 Port SFP+ Ethernet Adapter by Intel	
Function	NIC	
OS Support	Windows, Linux, VMware	
Virtualization Support	Yes	
Ports	• 2 SFP+ 10Gbps	
Supported Protocols	• Ethernet, iSCSI, FCoE,	
Interface	• PCIe v2.0	
Features	• Intel® 82599 10 Gigabit Ethernet Controller • Intel Direct I/O Technology • DCB Support • iSCSI support • FCoE support • IPSec Offload • QOS • Virtual Machine Device Queues (VMDq), Next Gen VMDq	• Virtual Machine Load Balancing (VMLB) • Jumbo Frames • MSI-X • SR-IOV Capable – 64 Virtual Functions per port • Energy Efficient Ethernet • DMA Coalescing • Full wake up support • PXE, iSCSI, FCoE boot • Direct Cache Access (DCA)
Tools	• Intel PROSet for Windows, SNMP	

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AnyFabric X540-T2

Name	Lenovo ThinkServer X540-T2 AnyFabric 10Gb 2 Port Base-T Ethernet Adapter by Intel	
Function	NIC	
OS Support	Windows, Linux, VMware	
Virtualization Support	Yes	
Ports	• 2xRJ-45 10Gbps	
Supported Protocols	• Ethernet, iSCSI, FCoE	
Interface	• PCIe v2.1	
Features	• Intel® X540 10 Gigabit Ethernet Controller • Intel Direct I/O Technology • iSCSI support • FCoE support • DCB Support • IPSec Offload • QOS • Virtual Machine Device Queues (VMDq), Next Gen VMDq • Virtual Machine Load Balancing (VMLB)	• Jumbo Fames • MSI-X • SR-IOV Capable – 64 Virtual Functions per port • Multi-Core load balancing • Flexible Port Provisioning (FPP) • Energy Efficient Ethernet • DMA Coalescing • Full wake up support • PXE, iSCSI, FCoE Boot
Tools	• Intel PROSet for Windows, SNMP	

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HBA

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Lenovo Direction – HBAs

- QLogic and Emulex are industry leaders in Fibre Channel HBAs
- Enterprise customers standardize on one vendor
- QLogic and Emulex Fibre offered for key requirements
  - PCIe
    - 8Gbps 2 port HBA – Emulex LPE16002b-M8-L
    - 16Gbps 2 port HBA – Emulex LPE16002b-M6-L and Qlogic QLE2672
  - AnyFabric
    - 8Gbps 2 port HBA – Emulex LPE16002b-M8-L
    - 16Gbps 2 port HBA – Emulex LPE16002-M6-L
- Customers will choose based on internal vendor standards and speed/port requirements

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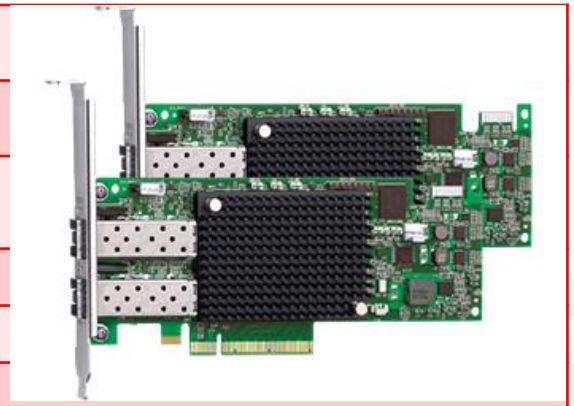
Emulex LPE16002B-M8-L

Name	Lenovo ThinkServer LPe16002B-M8-L PCIe 8Gb 2 Port Fibre Channel Adapter by Emulex
Function	Fibre Channel HBA
OS Support	Windows, Linux, VMware
Virtualization Support	Yes
Ports	2x8Gbps Fibre Channel (16002b)
Supported Protocols	Fibre Channel
Interface	• PCIe v3.0
Features	• PCIe 3.0 bus • vScale™ performance and scalability—multicore ASIC engine with eight cores supports 255 virtual functions (VFs), 1024 • MSI-X - Message Signaled Interrupts eXtended and 8192 logins/open exchanges for maximum virtual machine (VM) density—up to 4x more than other adapters • 2x management functionality, and takes half the time to manage with OneCommand® Manager • GreenState™ power efficiency—reduces data center power consumption and associated OPEX by delivering up to 4x better IOPS performance/watt • T10 PI - BlockGuard® data integrity offload— high performance end-to-end data integrity protects against silent data corruption • vEngine™ CPU offload—lowers CPU burden on host server, enabling support for more VMs • Rock-solid reliability and thermal characteristics, essential for mission-critical, cloud and virtualized applications • Support for 16GFC, 8GFC and 4GFC devices • NPIV - Comprehensive virtualization capabilities with support for N_Port ID Virtualization and Windows virtual HBAs • FC-SP - Host-to-fabric Fibre Channel Security Protocol authentication • Common driver model, allows a single driver to support all Emulex HBAs on a given OS
Tools	• OneCommand Manager, OneCommand Manager for VMWare vCenter, SMI-S and Common HBA API support



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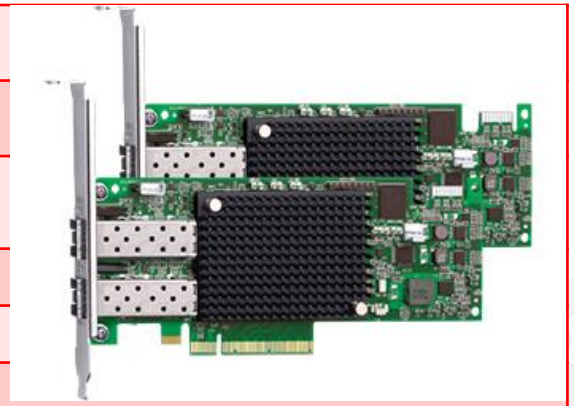
Emulex LPE16002B-M6-L

Name	Lenovo ThinkServer LPe16002B-M6-L PCIe 16Gb 2 Port Fibre Channel Adapter by Emulex
Function	Fibre Channel HBA
OS Support	Windows, Linux, VMware
Virtualization Support	Yes
Ports	2x16Gbps Fibre Channel (16002b)
Supported Protocols	Fibre Channel
Interface	• PCIe v3.0
Features	• PCIe 3.0 bus • vScale™ performance and scalability—multicore ASIC engine with eight cores supports 255 virtual functions (VFs), 1024 • MSI-X - Message Signaled Interrupts eXtended and 8192 logins/open exchanges for maximum virtual machine (VM) density—up to 4x more than other adapters • 2x management functionality, and takes half the time to manage with OneCommand® Manager • GreenState™ power efficiency—reduces data center power consumption and associated OPEX by delivering up to 4x better IOPS performance/watt • T10 PI - BlockGuard® data integrity offload— high performance end-to-end data integrity protects against silent data corruption • vEngine™ CPU offload—lowers CPU burden on host server, enabling support for more VMs • Rock-solid reliability and thermal characteristics, essential for mission-critical, cloud and virtualized applications • Support for 16GFC, 8GFC and 4GFC devices • NPIV - Comprehensive virtualization capabilities with support for N_Port ID Virtualization and Windows virtual HBAs • FC-SP - Host-to-fabric Fibre Channel Security Protocol authentication • Common driver model, allows a single driver to support all Emulex HBAs on a given OS
Tools	• OneCommand Manager, OneCommand Manager for VMWare vCenter, SMI-S and Common HBA API support



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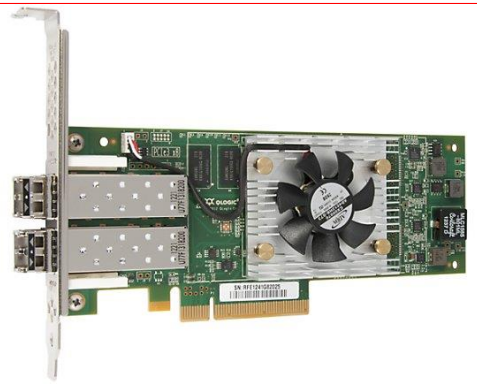
QLogic QLE2672

Name	Lenovo ThinkServer QLE2672 PCIe 16Gb 2 Port Fibre Channel Adapter by Qlogic
Function	Fibre Channel HBA
OS Support	Windows, Linux, VMware
Virtualization Support	Yes - VMflex™ technology
Ports	1x16Gbps (QLE2670) / 2x16Gbps (QLE2672)
Supported Protocols	Fibre Channel
Interface	PCIe V3.0
Features	• 1.2M IOPS • NPIV - Comprehensive virtualization capabilities with support for N_Port ID Virtualization • INTx and MSI-X • FC-SP - Host-to-fabric Fibre Channel Security Protocol authentication • Support for 16GBps, 8Gbps, and 4Gbps Fibre Channel devices • StarPower technology for power optimization • QLogic's unified driver model (firmware embedded in the driver) eliminates potential interoperability issues between firmware and driver versions
Tools	QConvergeConsole® (QCC). HBA API, SMI-S



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AnyFabric Emulex LPE15004-M8-L

Name	Lenovo ThinkServer LPm15004-M8-L AnyFabric 8Gb 4 Port Fibre Channel Adapter by Emulex
Function	Fibre Channel HBA
OS Support	Windows, Linux, VMware
Virtualization Support	Yes
Ports	4x8Gbps Fibre Channel
Supported Protocols	Fibre Channel
Interface	• PCIe v3.0
Features	• PCIe 3.0 bus • vScale™ performance and scalability—multicore ASIC engine with eight cores supports 255 virtual functions (VFs) • 1024 MSI-X - Message Signaled Interrupts eXtended and • 8192 logins/open exchanges for maximum virtual machine (VM) density—up to 4x more than other adapters • 2x management functionality, and takes half the time to manage with OneCommand® Manager • GreenState™ power efficiency—reduces data center power consumption and associated OPEX by delivering up to 4x better IOPS performance/watt • T10 PI - BlockGuard® data integrity offload— high performance end-to-end data integrity protects against silent data corruption • vEngine™ CPU offload—lowers CPU burden on host server, enabling support for more VMs • Rock-solid reliability and thermal characteristics, essential for mission-critical, cloud and virtualized applications • Support for 8GFC and 4GFC devices • NPIV - Comprehensive virtualization capabilities with support for N_Port ID Virtualization and Windows virtual HBAs • FC-SP - Host-to-fabric Fibre Channel Security Protocol authentication • Common driver model, allows a single driver to support all Emulex HBAs on a given OS
Tools	• OneCommand Manager, OneCommand Manager for VMWare vCenter, SMI-S and Common HBA API support

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AnyFabric Emulex LPE16002-M6-L

Name	Lenovo ThinkServer LPm16002-M6-L AnyFabric 16Gb 2 Port Fibre Channel Adapter by Emulex
Function	Fibre Channel HBA
OS Support	Windows, Linux, VMware
Virtualization Support	Yes
Ports	2x16Gbps Fibre Channel (16002b)
Supported Protocols	Fibre Channel
Interface	• PCIe v3.0
Features	• PCIe 3.0 bus • vScale™ performance and scalability—multicore ASIC engine with eight cores supports 255 virtual functions (VFs) • 1024 MSI-X - Message Signaled Interrupts eXtended • 8192 logins/open exchanges for maximum virtual machine (VM) density—up to 4x more than other adapters • 2x management functionality, and takes half the time to manage with OneCommand® Manager • GreenState™ power efficiency—reduces data center power consumption and associated OPEX by delivering up to 4x better IOPS performance/watt • T10 PI - BlockGuard® data integrity offload— high performance end-to-end data integrity protects against silent data corruption • vEngine™ CPU offload—lowers CPU burden on host server, enabling support for more VMs • Rock-solid reliability and thermal characteristics, essential for mission-critical, cloud and virtualized applications • Support for 16GFC, 8GFC and 4GFC devices • NPIV - Comprehensive virtualization capabilities with support for N_Port ID Virtualization and Windows virtual HBAs • FC-SP - Host-to-fabric Fibre Channel Security Protocol authentication • Common driver model, allows a single driver to support all Emulex HBAs on a given OS
Tools	• OneCommand Manager, OneCommand Manager for VMWare vCenter, SMI-S and Common HBA API support

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CNA

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Lenovo Direction - CNA

- Converged Network Adapters (CNAs) evolving
  - Support Ethernet and Storage Offload (iSCSI and FCoE)
- Industry Leading Emulex offered to meet customer requirements
  - PCIe
    - 10Gbps Dual Port SFP+ --Emulex OCe14102-UX-L
    - 40Gbps Single Port QSFP+ -- Emulex OCe14401-UX-L
  - AnyFabric
    - 10Gbps Dual Port SFP+ -- Emulex OCe14102-UX-L
    - 10Gbps Quad Port SFP+ -- Emulex OCe14104-UX-L

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Emulex OCe14102-UX-L

Name	Lenovo ThinkServer OCe14102-UX-L PCIe 10Gb 2 Port SFP+ Converged Network Adapter by Emulex	
Function	CNA	
OS Support	Windows, Linux, VMware	
Virtualization Support	Yes	
Ports	2x10gbps Direct Connect Copper SFP+	
Supported Protocols	Ethernet, FCoE, iSCSI	
Interface	PCIe v3.0	
Features	• FCoE Offloads • iSCSI Offloads • Virtual Network Fabrics (NVGRE & VXLAN) • SR-IOV • N_Port ID virtualization (NPIV) • Jumbo Frames • QOS • MSI-X	• Large send offload (LSO) • Large receive offload (LRO) • Receive side scaling (RSS) • VMware® NetQueue and Microsoft® VMQ • PXE, iSCSI, FCoE Boot • T10 PI support for end-to-end data integrity • 4 NIC Functions per port (1 storage function per port for CAN, leaving 3 NIC functions) • DCB Support
Tools	OneCommand Manager, OneCommand Manager for Vmware	

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Emulex OCe14401-UX-L

Name	Lenovo ThinkServer OCe14401-UX-L PCIe 40Gb 1 Port QSFP+ Converged Network Adapter by Emulex	
Function	CNA	
OS Support	Windows, Linux, VMware	
Virtualization Support	Yes	
Ports	1x40gbps Direct Connect Copper QSFP+	
Supported Protocols	Ethernet, FCoE, iSCSI	
Interface	PCIe v3.0	
Features	• FCoE Offloads • iSCSI Offloads • Virtual Network Fabrics (NVGRE & VXLAN) • SR-IOV • N_Port ID virtualization (NPIV) • Jumbo Frames • QOS • MSI-X	• Large send offload (LSO) • Large receive offload (LRO) • Receive side scaling (RSS) • VMware® NetQueue and Microsoft® VMQ • PXE, iSCSI, FCoE Boot • T10 PI support for end-to-end data integrity • 4 NIC Functions per port (1 storage function per port for CAN, leaving 3 NIC functions) • DCB Support
Tools	OneCommand Manager, OneCommand Manager for Vmware	

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AnyFabric Emulex OCe14102-UX-L

AnyFabric™

Name	Lenovo ThinkServer OCe14102-UX-L PCIe 10Gb 2 Port SFP+ Converged Network Adapter by Emulex	
Function	CNA	
OS Support	Windows, Linux, VMware	
Virtualization Support	Yes	
Ports	2x10gbps Direct Connect Copper SFP	
Supported Protocols	Ethernet, FCoE, iSCSI	
Interface	PCIe v3.0	
Features	• FCoE Offloads • iSCSI Offloads • Virtual Network Fabrics (NVGRE & VXLAN) • SR-IOV • N_Port ID virtualization (NPIV) • Jumbo Frames • QOS • MSI-X	• Large send offload (LSO) • Large receive offload (LRO) • Receive side scaling (RSS) • VMware® NetQueue and Microsoft® VMQ • PXE, iSCSI, FCoE Boot • T10 PI support for end-to-end data integrity • 4 NIC Functions per port (1 storage function per port for CAN, leaving 3 NIC functions) • DCB Support
Tools	OneCommand Manager, OneCommand Manager for Vmware	

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AnyFabric Emulex OCe14104-UX-L

Name	Lenovo ThinkServer OCe14104-UX-L PCIe 10Gb 2 Port SFP+ Converged Network Adapter by Emulex	
Function	CNA	
OS Support	Windows, Linux, VMware	
Virtualization Support	Yes	
Ports	4x10gbps Direct Connect Copper SFP	
Supported Protocols	Ethernet, FCoE, iSCSI	
Interface	PCIe v3.0	
Features	• FCoE Offloads • iSCSI Offloads • Virtual Network Fabrics (NVGRE & VXLAN) • SR-IOV • N_Port ID virtualization (NPIV) • Jumbo Frames • QOS • MSI-X	• Large send offload (LSO) • Large receive offload (LRO) • Receive side scaling (RSS) • VMware® NetQueue and Microsoft® VMQ • PXE, iSCSI, FCoE Boot • T10 PI support for end-to-end data integrity • 4 NIC Functions per port (1 storage function per port for CAN, leaving 3 NIC functions) • DCB Support
Tools	OneCommand Manager, OneCommand Manager for Vmware	

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Management Tools

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Management Tools

Tool	Features
Intel PROSet for Windows	Integrated into Windows Device Manager Adapter Properties. Extends driver functionality to provide additional reliability and QOS features.
Intel Advanced Network Services (Intel ANS)	Manages port teaming, including advanced teaming technologies such as Virtual Machine Load Balancing
Simple Network Management Protocol (SNMP)	Industry standard management protocol for managing and monitoring network connected devices
Emulex OneCommand Manager	Provides centralized management of Emulex fabric (Fibre Channel HBA) and network (CNA and 10Gb/s Ethernet Adapter) connectivity solutions in physical and virtual server deployments through a graphical user interface (GUI) as well as a fully scriptable command line user interface (CLI)
Emulex OneCommand Manager for vCenter	A software plug-in that integrates real-time lifecycle management of adapters provided by Emulex into the VMware vCenter console. Features include multiprotocol management (Fibre Channel (FC), FC over Ethernet (FCoE), iSCSI, Network Interface Card (NIC)), online firmware flashing, configuration updates, adapter diagnostics, plus flexible graphical and command line interfaces.
QLogic SANsurfer FC HBA Manager	The SANSurfer FC HBA Manager provides a graphical user interface (GUI) that lets you easily install, configure, and deploy QLogic Fibre Channel HBAs. It also provides robust diagnostic and troubleshooting capabilities and useful statistical information to optimize SAN performance.
QLogicSANsurfer FC HBA Manager CLI	Simplified version of SANSurfer HBA Manager, allowing command line access to the HBA or CNA adapters installed on the local system
QLogic QConvergeConsole® (QCC)	Provides single pane-of-glass management for QLogic's broad product line of storage and networking adapters. Includes a lightweight CLI and a VMware vCenter Plugin.
HBA Application Programming Interface (HBA API)	An industry standard Application Programming Interface (API) for Fibre Channel HBA adapters to allow multi-vendor programmable management of SANs
Storage Management Initiative - Specification (SMI-S)	An Industry Standard storage interface to enable broad interoperable management of heterogeneous storage vendor systems

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Backup

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Glossary

- Converged Network Adapter (CNA):
  - Supports combining Network Interface Controller (NIC) functionality, particularly Ethernet, and Host Bus Adapter (HBA) storage functionality, such as FCoE and iSCSI into one network connection. This simplifies network design and enables trends such as Software Defined Networking (SDN) and Software Defined Datacenter (SDD). Provides iSCSI and FCoE processing offload, moving the frame processing load from the server to the CNA.
- Data Center Bridging
  - Provides guaranteed delivery of data over Ethernet networks. Important for storage over Ethernet technologies (FCoE, iSCSI)
- Fibre Channel over Ethernet (FCoE):
  - Allows Fibre Channel traffic over Ethernet networks through encapsulation. Generally requires 10Gbps or faster Ethernet networks, and is not routable. Frame processing uses server resources, unless Converged Network Adapters (CNA) with offloading capabilities are used.
- Fibre Channel Security Protocols (FC-SP)
  - Protects Fibre Channel communications
- Host Bus Adapter (HBA):
  - Provides connectivity between a server and a storage device, such as a Fibre Channel SAN or a SAS enclosure
- Internet Small Computing System Interface (iSCSI):
  - Allows SCSI traffic over TCP/IP networks. Generally requires 1Gbps or faster Ethernet networks, and is routable. Frame processing uses processor resources, unless Converged Network Adapters (CNA) with offloading capabilities are used.
- Large Segmentation Offload (LSO), Generic Segmentation Offload (GSO), Large Receive Offload (RSO)
  - Techniques for allowing a NIC with large buffers to manage network traffic to reduce CPU overhead

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Glossary

- Message Signaled Interrupts (MSI-X)
  - Advanced PCI interrupt processing
- N_Port ID Virtualization (NPIV)
  - In Fibre Channel environments allows virtual Node Port ID's on one physical Node Port
- Receive Side Scaling (RSS)
  - Allows a NIC to distribute processor load across multiple processor cores
- Quality of Service (QOS)
  - Allows network traffic prioritization
- Single Root I/O Virtualization (SR-IOV)
  - Allows direct access to the adapter from a virtual machine
- T10-Protection Information (T10-PI)
  - Provides end-to-end data integrity in networked storage environments

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